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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
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ART UNIT	PAPER NUMBER
4111	

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01/26/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/532,945	SEYAMA, YUKITAKA	
	Examiner	Art Unit	
	JACOB MARKS	4111	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☒ Claim(s) *4-6, 8, and 9* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☒ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :10-26-07; 10-27-2006; 4-26-2005.

DETAILED ACTION

Claim Objections

Claims 4-6, 8, and 9 are objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend upon any other multiple dependant claim. See MPEP § 608.01(n).

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 1 - 12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claims contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claims 1 – 3 and 12, applicant does not define the variable X_{max} sufficiently for one skilled in the art to make and use the invention. The claim itself only defines “the variable X_{max} as the maximum one of the value X” (see claim 1). Looking to the specification, applicant describes the variable X_{max} as "the maximum value X can have when the graphite which stores lithium by charging represented by Li_xC_6 that is, the maximum value of the charging depth” (see spec. pg. 2 lines 13-14). Later on in the specification applicant defines X_{max} mathematically using the equation X_{max} = T(mAh) / (Z (g) x 372 mAh/g) (see

spec. pg. 4 line 3). The variable T is described in the specification as being set to the total discharge capacities C1, C2, C3, and C4, where C1-C4 are defined as different discharge capacities.

This description of X_{max} in the specification is inadequate for several reasons. First, the variable X_{max} is ambiguous as to whether it is describing the available Lithium content of the battery, as described by the Li_xC_6 (see spec. pg. 2 lines 14-15), or whether it is describing the fractional discharge capacity, which is what the equation appears to calculate as X_{max} as (see spec. pg. 4 line 3). In addition, X_{max} could reasonably be interpreted as meaning the battery's maximum discharge depth, which the specification appears to describe as the "maximum charging depth" (see spec. pg. 2 lines 13-14). Furthermore, the manner in which T (the variable used to calculate X_{max}) is calculated is unclear. The specification only describes T as being set to the total discharge capacities C1, C2, C3, and C4. It is unclear whether the specification means that T is set to the sum of C1-C4, the average of C1-C4, or whether there are several data sets wherein there are several values of T that should be calculated for different discharge rates. The data presented in Table 1 (spec. pg. 12) does not provide any guidance as it does not show the any of the variables on which the calculation of X_{max} depends, it merely shows different values of X_{max}. The specification does not define X_{max} adequately enough for one of ordinary skill in the art to make and use the invention, therefore, undue experimentation would be required in order to calculate and use X_{max}.

Factors to be considered when determining whether the claimed invention would require undue experimentation are given in MPEP 2164.01 (a). See, *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). Only relevant factors will be addressed for determining undue experimentation of the presently claimed invention. The relevant factors are (A) the state of the prior art, (B) the level of one of ordinary skill, (C) the amount of direction provided by the inventor, and (D) the existence of working examples.

(A) The State of the Prior Art: Naruaki (JP 2000-195558) describes a battery cell constructed with $LiMnO_2$ that should perform at around 50% of the theoretical capacity (par. 33, 40). Performance of the battery at 50% of theoretical capacity can greatly reduce capacity deterioration (par. 40). The instant application may be attempting to specify a range for the discharge depth or charge depth that should be maintained for optimal performance; however this range is not clearly defined because it is unclear how X_{max} is calculated, as explained above.

(B) The Level of One of Ordinary Skill:

It would be unclear to one of ordinary skill in the art how to calculate the "charging depth", X_{max}, of the battery because of ambiguity in the specification. Furthermore, one of ordinary skill in the art would not know how to calculate the value of T, which is used to calculate X_{max}.

(C) The amount of Direction Provided by the Inventor:

Applicant does not provide adequate direction for how X_{max} should be calculated because it is unclear how T is calculated in the X_{max} equation. It is

unclear whether the specification means that T is set to the sum of C1-C4, the average of C1-C4, or whether there are several data sets wherein there are several values of T that should be calculated for different discharge rates.

(D) The Existence of Working Examples:

Applicant does not provide an adequate example for how X_{max} should be calculated based on the data provided. The data presented in Table 1 (spec. pg. 12) does not provide any guidance as it does not show how any of the variables on which the calculation of X_{max} depends, it merely shows different values of X_{max}. The specification does not define X_{max} adequately enough for one of ordinary skill in the art to make and use the invention, therefore, undue experimentation would be required in order to calculate and use X_{max}.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1 – 12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

There is not an adequate definition of X_{max} in any of claims 1-3 and 12. Claim 1 merely defines X_{max} as the maximum one of value X, which is essentially a circular definition. Therefore, all the claims, which recite the variable X_{max} are indefinite.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobs et al. (US Pat. No. 5,721,067), in view of Naruaki.

Regarding claims 1 and 12, Jacobs et al. teaches a nonaqueous electrolyte secondary battery which comprises a lithium-transition metal compound containing positive electrode (6) including an electrode made from the material $Li_xMn_2O_4$. One of ordinary skill in the art would recognize that $Li_xMn_2O_4$ has an inherently spinel structure (col. 4 lines 25-35). Jacobs et al. also teaches a lithium battery that has a negative electrode bearing carbonaceous materials (2) including graphite capable of storing and discharging lithium (col. 6 lines 24-54); and nonaqueous electrolyte333. Jacobs et al. discloses that the ratio of the theoretical capacity of the negative electrode plate to the theoretical capacity of the positive electrode plate, defined as $R_{N/S}$ in the claim, may be between 0.85 and 1.15 (col. 3 line 49 – col. 4 line 7). Jacobs et al. does not teach a charging depth.

However, Naruaki teaches a method of charging a Lithium Manganese composite battery wherein the charge depth, X_{max} is 50% (see par. 33, 40). If

$R_{N/S}$ is between 0.85 and 1.15 then X_{max} at 50% would satisfy conditions (1) and (2) of claim 1. Naruaki teaches that maintaining the charge depth at around 50% can make greatly reduce capacity deterioration (par. 40). Therefore, one of ordinary skill in the art would have found it obvious to combine the Lithium Battery of Jacobs et al. with the charging method of Naruaki in order to reduce capacity deterioration.

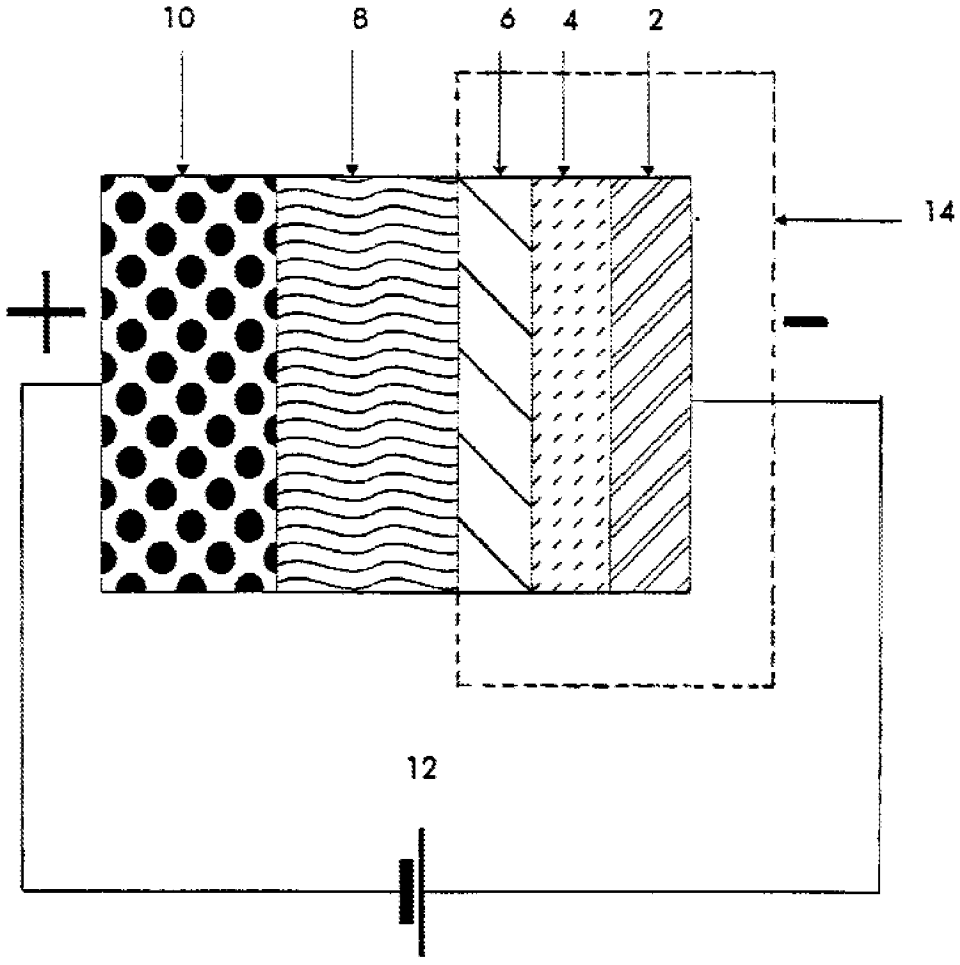

Fig. 1

Regarding claim 2, if $R_{N/S}$ is between 0.85 and 1.15 as in Jacobs et al. (col. 4 lines 25-35), then the X_{max} value of 50% as in Naruaki would satisfy condition (3) of claim 2 (see par. 33, 40).

Regarding claim 3, Naruaki teaches that X_{max} may be 50%, which is less than 0.65 (par. 33, 40).

Regarding claim 4, Jacobs et al. teaches that $R_{N/S}$ may be between .85 and 1.15, which overlaps the claimed range of greater than 0.80 (col. 3 line 49 – col. 4 line 7).

Regarding claim 5, Jacobs et al. teaches a lithium manganese oxide compound where the mole ratio of lithium to manganese may be between 0.5 and 0.63 or smaller (col. 4, lines 33-39).

Regarding claims 6 and 7, Jacobs et al. teaches that the lithium manganese oxide compound may contain other elements such as copper and chromium (col. 4 lines 33-39).

Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobs et al. and Naruaki as applied to claims 1 and 7, further in view of Shuji (JP 2000-067863).

Regarding claim 8, the aforementioned prior art does not specifically teach the incorporation of mesophase pitch-based graphite within the disclosed device.

Shuji teaches using mesophase pitch-based graphite in a Lithium ion battery electrode (par. 15). Shuji teaches that mesophase pitch graphite is one of many materials that are suitable for use as the carbonaceous material in the electrode of a lithium ion battery (par. 15). The selection of a known material,

which is based upon its suitability for the intended use, is within the ambit of one of ordinary skill in the art. See, *In re Leshin*, 125 USPQ 416 (CCPA 1960); see also, MPEP § 2144.07). The motivation to make this modification would be to facilitate the materials intended use as a suitable electrode. Therefore, one of ordinary skill in the art would have found it obvious to use the mesophase pitch-based graphite of Shuji in the Lithium ion battery of Jacobs et al. because such graphite would have been suitable for such an electrode.

Claims 9-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jacobs et al., Naruaki, and Shuji as applied to claims 1-8, further in view of Daido et al. (US Pat. No. 6,818,352).

Regarding claims 9 and 10, Daido teaches that the nonaqueous electrolyte solvent of a lithium ion battery may consist of vinylene carbonate (col. 12 lines 40-49). Daido teaches that such solvents are suitable for use as electrolytes in Lithium ion batteries. The selection of a known material, which is based upon its suitability for the intended use, is within the ambit of one of ordinary skill in the art. See *In re Leshin*, 125 USPQ 416 (CCPA 1960); see also MPEP § 2144.07). Therefore, one of ordinary skill in the art would have combined the vinylene carbonate electrolyte solvent of Daido with the Lithium ion battery of Jacobs et al. in order to obtain a suitable electrolyte solvent for the battery.

Regarding claim 11 none of Jacobs et al., Naruaki, Shuji, or Daido et al. teaches a specific concentration of the vinyl compound. However, Daido teaches that the electrolyte solvent may consist of vinylene carbonate. The concentration

of the vinyl compound is a known result- effective variable. The discovery of an optimum value of a known result effective variable, without producing any new or unexpected results, is within the ambit of a person of ordinary skill in the art. See, *In re Boesch*, 205 USPQ 215 (CCPA 1980); see also, MPEP § 2144.05, II). Therefore, one of ordinary skill in the art would have found it obvious to use a vinyl compound concentration of between 0.0004 and 1.5 wt% because the vinyl compound is a known result-effective variable.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JACOB MARKS whose telephone number is (571)270-7873. The examiner can normally be reached on Monday through Friday 7:30-5:00 alt Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Sines can be reached on 571-272-1263. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/jm/

/Brian Sines/

Supervisory Patent Examiner, Art Unit 4111